



NATURAL RESOURCES  
POLICY CONSULTATIVE  
GROUP FOR AFRICA

A joint initiative of the U.S. Agency for International Development & World Resources Institute

Policy Brief #4 August 1996

# Environmental Information Systems

## A Tool for Sustainable Environmental Management in Africa

by Ndey-Isatou Njie

This brief is based upon the keynote address given by the author at the AFRICAGIS'95 conference in Abidjan, Côte d'Ivoire, on March 5, 1995.

### Contents

[Strategic Environmental Management](#)

[The Role of Environmental Information](#)

[The Gambia Environmental Action Plan](#)

[Regional Cooperation](#)

[Capacity Building](#)

[Sustainability](#)

### Strategic Environmental Management

Environmental degradation continues to threaten the quality of life of people in sub-Saharan Africa. Despite efforts to reverse this trend, for the most part the sectoral, short-term, and ad hoc approaches adopted to manage the environment have not brought about significant improvement. As a result, African and other international policy-makers are turning to long-term strategic plans to integrate social, economic, and environmental perspectives in ways that reflect the complexity of environmental management.

Most African countries are now either preparing or implementing these strategic plans, mainly as National Environmental Action Plans, National Conservation Strategies, and National Environmental Management Plans. In addition, international initiatives emanating from the 1992 Earth Summit (UNCED)-the implementation of Agenda 21, and the conventions on climate change, biodiversity, and

desertification-provide opportunities to create decision-making structures that promote the sustainable use of natural resources.

## **The Role of Environmental Information**

An important outcome of these strategic planning processes is the priority given to effective information management. Indeed, a general consensus now surrounds the importance of information for environmental policy analysis and formulation. It is now also widely accepted that weak information management has often constrained effective natural resource planning. Specifically, the absence of or inaccessibility to information has meant that decision-making too often takes place in a vacuum.

Environmental information systems (EIS) can address this problem head on by making it easier for information and subject specialists to provide policy-makers with timely, accurate, and appropriate data. Environmental information systems, including GIS, can enhance cooperation and coordination among institutions. They can help analysts identify information needs, and, through the preparation of maps and statistics, guide decision-making. A well-designed EIS provides an institutional framework for guiding and building information management, while GIS is a technical planning tool for integrating spatial data of different types. GIS can also help answer the "what if?" questions that lead to practical policy options.

The guiding principle behind the design and implementation of strategic plans and their supporting information-management systems is stakeholder participation. This is a prerequisite for the development of common data standards and the other building blocks of effective information management.

While information management receives higher priority than it once did, room for improvement abounds, especially in the practical use of information by policy-makers. One critical need is to present the information in an accessible and convincing manner to the decision-makers. Another is to use information more systematically and rigorously at all levels of decision-making. Both can be met by fully exploiting the power of GIS and related computer-based technologies- technologies that offer a holistic view of natural resource conditions and trends and that in turn allow users to formulate broad-based and longer-lasting solutions to environmental degradation.

The rapid data-retrieval and recombination qualities of GIS permit users to generate precise and timely maps and statistics that help answer specific policy-related questions. GIS also allows users to integrate spatial data-whether economic, environmental, or social-in new and imaginative ways. This flexibility does raise important issues of data standards and operations of both a technical and institutional nature. But, on balance, EIS combined with GIS can be a powerful decision-making tool.

## **The Gambia Environmental Action Plan**

The Gambia, like the other Sahelian countries, has experienced cyclical droughts for the past three decades. Drought, coupled with rapid population growth, has wreaked considerable environmental degradation. In rural areas, where most people depend on rain-fed agriculture, widespread deforestation, loss of top soil, overgrazing, and bushfires have degraded the land. The River Gambia, which spans the country's length, is salinized more than halfway up country, which, among other things, reduces rice production.

In urban areas, where according to the last population census more than one third of the population resides, the main environmental problem is waste management. Along the coasts, where tourism-related development is significant, beach erosion is very severe. In fact, coastal erosion, estimated at about one

meter per year, is already threatening infrastructure and places along the coastline of cultural, scenic, or economic importance.

It is against this background of rising environmental degradation that the Gambia Environmental Action Plan (GEAP) was prepared. The GEAP policy framework for ongoing environmental and natural resources management is based upon existing data on forest cover, wildlife populations, agricultural productivity, solid-waste generation, and other indicators of natural resource and environmental management. Access to this information heightened awareness among decision-makers of the urgency of some of these environmental problems. This awareness was translated into broad-based support for the GEAP and the development of an associated environmental information-management program, also known as the Gambia Environmental Information System (EIS) program, which was designed to meet the country's specific development priorities.

Like the GEAP, the form and function of the EIS program was decided in a very participatory manner. Many stakeholders took part. Representatives from government, NGOs, and the private sector held a workshop to prioritize information needs, choose an appropriate institutional framework, and decide what support was needed to implement the program. An EIS working group was formed to act as a steering committee and make decisions on such issues as standardization, data compatibility, and similar technical issues. Under the leadership of this working group, five priority data centers for natural resources management have been identified: the departments of soil and water management, water resources, agricultural planning, lands and surveys, and geology. Statistical, map, and bibliographic information from these centers will be developed according to a database architecture agreed upon by the EIS community. It is envisaged that the use of an agreed-upon architecture will facilitate the availability of timely, appropriate, and compatible information for decision-making. More data centers will be planned once the data sets in the initial six centers have been tested and found useful.

Guided by the needs for policy as articulated in the Gambia Environmental Action Plan, the EIS program departs from traditional data collection to a more demand-driven type of management. By providing a viable mechanism for consensus building, it also ensures that the data collected is relevant and actually gets used. Moreover, the EIS program is a critical input to The Gambia State of the Environment Report. Designed to monitor progress toward GEAP implementation, the first edition of this report will be available by the end of 1996.

The EIS working group is assisted by three specialist task forces. The spatial task force is very active, and it has recently decided on the scale of the maps to be digitized. Since the country is so small, maps will be digitized at 1:250 000. Collaborating with the University of Liverpool in the UK and The International Trypanotolerance Center (ITC) in The Gambia, and using 1993 photo-interpreted aerial surveys, this task force is working on a geographic information system to analyze changes in land cover related to tsetse distribution. The results will be used to help predict future trends in trypanosomiasis risk in The Gambia. This task force is also updating the master plan for the greater Banjul Area. The effort cuts across sectors and addresses issues in terms of environmental and social values in accordance with GEAP principles. (In the past, planning was narrow and sectoral.)

With help from the spatial data task force, the coastal and marine environment working group is developing an integrated coastal area master plan. In it, GIS will be used to map coastal resources and activities and to develop coastal area impact scenarios. Data from various sources will be used, including topographic maps. Differing scenarios will then be presented to decision-makers and the advantages or disadvantages of each scenario explained. It is hoped that the final choice will be influenced strongly by the findings of the GIS.

Interest in the EIS program is growing at all levels, and demands for specific products and outputs are increasing. This is especially encouraging considering how weak the technical resource base is in The Gambia. The participatory way in which the program was prepared has given a broad community of users a strong sense of ownership, and they now play a strong and necessary advocacy role.

An important lesson learned so far in The Gambia is that GIS can help bridge the gap between the analyst and the decision-maker. Raw data can be converted into a form that decision-makers can quickly grasp. For example, information generated from a recent study of forest and rangeland burning in The Gambia was presented as a series of maps that decision-makers easily understood. Extensive brush fires-regular occurrences in The Gambia-have been identified as a serious constraint to sustainable natural resource management. Maps that clearly document the extent and frequency of forest and range burning bolstered policy-makers' resolve to address this problem. (See [Figure 1.](#))

The integration of social and environmental considerations into national policies is an imperative of sustainable development. At the global level, the need to integrate social issues into development planning has been underscored by the Cairo Conference on Population and Development (September 1994), the Beijing Women's Summit (September 1995), and the Habitat II Conference (June 1996). In The Gambia, the integration of these different information types has been made easier by the preparation of local Agenda 21's, poverty-alleviation strategies, and population policies. These multi-sectoral plans address both social and environmental issues, and their implementation has required functional linkages among sectors to encourage dialogue and consensus building as a prelude to data-sharing. In turn, the need to share information has also stimulated the development of common data standards.

## **Regional Cooperation**

Despite significant national progress to improve data access and exchange, regionally in Africa, environmental information is not readily shared. Indeed, getting countries to do so is another critical challenge. Improved analysis and decision making-as well as the cost-effective use of relatively expensive data-must spring from genuine cooperation and a willingness to share results. Although paper maps are usually available, reluctance to share digital data and particularly digital maps is common. To date, the only widely available digital maps for Africa are at 1:1 000 000. But analysts need larger scale-that is, more detailed-maps and data to assess environmental conditions and trends and to propose solutions to environmental degradation at the national and sub-national levels.

Today's regional organizations offer a viable institutional base for effective information sharing in Africa. They could define the modes of information exchange and help national EIS specialists develop data standards. Increased cooperation and coordination would be particularly useful in implementing conventions that have regional and global dimensions. For example, regional databases could greatly help signatories implement conventions that are inherently transboundary.

## **Capacity Building**

There is a need to build technical capacity if current national efforts are to be sustainable. The Gambia is an excellent example of the use of regional resources to build capacity nationally. The Gambia's National Environment Agency was assisted by the Center de Suivi Ecologique (CSE) in Dakar in training staff and implementing the EIS program. CSE knows the country's environmental problems, it has data that can be used to analyze those problems, and its technical support is tailor-made to meet The Gambia's needs.

Similar organizations elsewhere in Africa could operate in the same manner. If these centers of excellence coordinate their activities, each develops its comparative advantage and the training and capacity building needs of most African countries can be met. At least initially, success will depend partly on how much support the international community gives regional organizations trying to build national capacity.

Effective mechanisms for networking are required at the national, regional, and individual levels. In The Gambia, an information exchange network was developed with technical assistance from Ghana. The valuable insights and experience provided by a Ghanaian expert were instrumental in helping Gambians to understand the major elements of information systems.

Various useful networks now exist in Africa to exchange information and share development lessons learned. Similar networks for information-management practitioners could disseminate information to their members, organize workshops to share experiences, and working with technical and academic organizations, implement member-training programs. They could also help build consensus on data standards, the definition of regional priorities, and the development of regional databases.

One specific example of information exchange is the Network for Environment and Sustainable Development in Africa (NESDA) based in Abidjan. This network of African environmental management practitioners has fostered information exchange among its members by convening seminars, establishing a newsletter and e-mail connectivity and strengthening local chapters. Environmental information networks could learn a great deal from NESDA.

## **Sustainability**

Sustainability is fundamental to the success of EIS programs, and with the advent of these programs, necessary strides toward cost-effective information management will be made. Demand-driven EIS programs cut down significantly on the traditional costs related to information management in Africa. While the technology is becoming increasingly affordable, analysts should keep functional systems as simple as possible. At the same time, policy-makers should promote national ownership of information-management programs, achieved through dialogue and consensus building.

The systems also need to generate enough revenue to become self-sustaining. For this reason, the need to build partnerships with the private sector and NGOs and other stakeholders who could use the information products and services from these programs is pressing. Indeed, only through such sustainable financing mechanisms can the potential for EIS be maximized so it serves the stakeholders' needs for many years to come.

[Ndey-Isatou Njie](#) is the Executive Director of The Gambia's National Environment Agency and a member of the PCG.

---